

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 21 MAY 2004

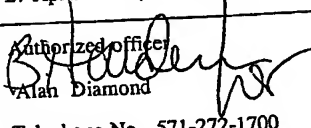
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Applicant's or agent's file reference PCT/01-52	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US02/05781	International filing date (day/month/year) 27 February 2002 (27.02.2002)	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC IPC(7): H10L 31/042, 23/58; H05B 33/00 and US Cl.: 136/261, 249, 244, 252, 255, 262; 428/917; 362/800; 257/636, 644, 646, 650, 79		
Applicant MIDWEST RESEARCH INSTITUTE		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of 0 sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 22 September 2003 (22.09.2003)	Date of completion of this report 27 April 2004 (27.04.2004)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer  Alan Diamond Telephone No. 571-272-1700

Form PCT/IPEA/409 (cover sheet)(July 1998)

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US02/05781

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed.
- ☒ the description:
 pages 1-32 as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____.
- ☒ the claims:
 pages 33-44, as originally filed
 pages NONE, as amended (together with any statement) under Article 19
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____.
- ☒ the drawings:
 pages 1-8, as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____.
- ☐ the sequence listing part of the description:
 pages NONE, as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____.

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US02/05781

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims <u>1-77</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>76, 77</u>	YES
	Claims <u>1-75</u>	NO
Industrial Applicability (IA)	Claims <u>1-77</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-75 lack an inventive step under PCT Article 33(3) as being obvious over Jia, U.S. Patent 5,912,068. Jia teaches a solar cell having, for example an overall structure of Si/SiO₂/YSZ/Si, wherein YSZ is yttria-stabilized zirconia, i.e., a perovskite oxide. It is the Examiner's position that the Si/SiO₂/YSZ structure inherently allows for the growth of semiconductor materials having a lattice constant from about 5.4 to about 5.9 angstroms, as here claimed. The Si at the right in the Si/SiO₂/YSZ/Si structure corresponds to an active first Si subcell layer, i.e., one having, for example, a pn junction. Other conventional semiconductor materials, such as those in instant 7, would have been within the skill of an artisan, as well as the use of a second active semiconductor subcell on top of the first subcell. Jia does not specifically teach the exact structure of its solar cell, whereas instant claims 1 and 50 call for terminals to conduct current from and into the photovoltaic cell. However, it would have been obvious to one of ordinary skill in the art to have provided Jia's solar cell device with conventional terminals so that current could be conducted from and into the device, as one skilled in the art would expect.

Claims 1-77 meet the criteria set out in PCT Article 33(2), because the prior art does not teach the photovoltaic cell, photovoltaic device, and light emitting device recited in these claims, which require particular silicon oxide and perovskite oxide layers.

Claims 76 and 77 meet the criteria set out in PCT Article 33(3), because the prior art does not fairly suggest the light emitting device in these claims, which require particular silicon oxide and perovskite oxide layers.

Claims 1-77 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.